

The Joint Common Missile Project — Program Management Lessons Learned

MAJ Robert F. Mortlock



The Joint Common Missile (JCM) Project offers a shining example of acquisition reform for acquisition development programs preparing for entry into system development and demonstration (SDD). The program is an Acquisition Category ID Joint, cooperative development program between the U.S. Army, Navy, Marine Corps and United Kingdom. The JCM Project Management Office's (PMO) mission is to develop a lethal, precision-guided, air-to-surface weapon with extended range.

The JCM, designed for the Navy's F/A-18E Super Hornet strike fighter (above), the Marine Corps' AH-1Z and the Army's AH-64D Apache Longbow attack helicopters, will streamline logistics and supply chain procedures by offering a common weapon for all platforms and services. (U.S. Navy photo by Photographer's Mate Airman Kathleen Gorby.)

JCM provides improved performance over the systems it will replace by using a tri-mode seeker incorporating imaging infrared, millimeter wave radar and semiactive laser sensors. The JCM seeker enables longer ranges, increased lethality, improved performance in adverse weather and significant hardening against countermeasures. Initial operational capability dates on the Apache AH-64D, Super Cobra AH-1Z, Super Hornet F/A-18E/F and Seahawk MH-60R range from FY09 to FY10 to fill the gap left by declining inventories of HELLFIRE, Maverick and aviation-launched TOW [Tube-launched, Optically tracked, Wire-guided] missile systems. The JCM PMO will achieve full Increment I requirements through a 4-year SDD program beginning with a 12-14 month risk mitigation phase followed by a 36-month system integration and demonstration phase.

Long-Term Strategic Planning

The critical underpinning support for any future development program occurs during concept refinement when strategic plans to address future warfighting capability gaps are developed. Prior to PMO formation, Program Executive Office (PEO) Tactical Missiles initiated and developed a long-term Strategic Business Plan that users and the science and technology (S&T) community accepted. The JCM user community identified the need to replace current aviation-launched tactical missile systems. The S&T community from the U.S. Army Aviation and Missile Research, Development and Engineering Command (AMRDEC) provided technical expertise on development timelines required for the high technical-risk areas of seeker, warhead and propulsion components. With the strategic plan in place, both the requirements generation process and S&T objective (STO) efforts to mature

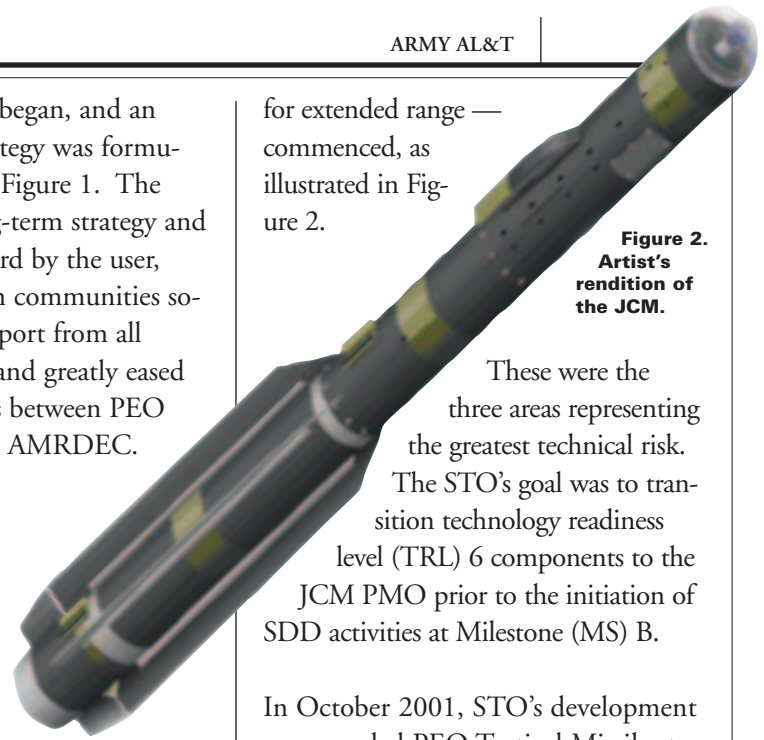
critical technologies began, and an early acquisition strategy was formulated, as depicted in Figure 1. The agreement for a long-term strategy and common path forward by the user, S&T and acquisition communities solidified program support from all major stakeholders, and greatly eased transition difficulties between PEO Tactical Missiles and AMRDEC.

Technology Transfer

The seamless transition of technology from the S&T community to a PMO for system development activities is central to acquisition transformation. A Technology Transfer Agreement between AMRDEC and PEO Tactical Missiles enabled the successful transition of critical component technologies to JCM PMO and provided a focused objective to develop a common missile. In October 1999, 4-year STO efforts for developing a tri-mode seeker — a single warhead to defeat both armor and military operations on urbanized terrain (MOUT) targets and a single boost/sustain rocket motor

for extended range — commenced, as illustrated in Figure 2.

Figure 2.
Artist's
rendition of
the JCM.



These were the three areas representing the greatest technical risk.

The STO's goal was to transition technology readiness level (TRL) 6 components to the JCM PMO prior to the initiation of SDD activities at Milestone (MS) B.

In October 2001, STO's development successes led PEO Tactical Missiles to establish the JCM PMO to oversee technology development (TD). The JCM PMO began the JCM program with a TD phase focused on technology maturation, and oversaw the STO efforts and initiation of system definition and risk reduction (SDRR) efforts. After the TD phase, the JCM critical subsystems were deemed TRL 6, the recommended maturity level for system integration activities. The smooth technology transition to the JCM PMO at the appropriate TRL for

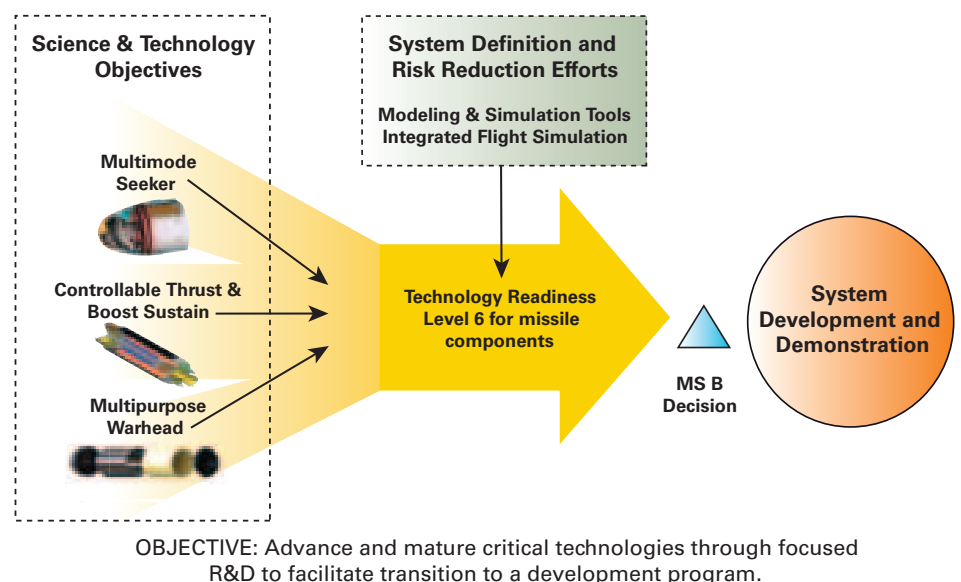


Figure 1. Early Acquisition Strategy

JCM specifications require a range of 16 km for rotary-wing aircraft and 28 km for fixed-wing. JCM's tri-mode seeker system provides improved performance in bad weather and is designed to block jamming efforts. (U.S. Marine Corps photo.)



JCM provides improved performance ... by using a tri-mode seeker incorporating imaging infrared, millimeter wave radar and semi-active laser sensors.

system integration and demonstration lowered risk and shortened the SDD schedule.

Simulation-Based Acquisition (SBA)

JCM PMO developed an acquisition strategy that relied heavily on a simulation-based development approach. With the SBA approach, the PMO realized the early need for an all-digital integrated flight simulation (IFS) tool to facilitate development and performance assessment. SDRR efforts focused on developing a high-fidelity IFS. The PMO used the IFS, verified by extensive laboratory and captive-flight testing, to evaluate contractor seeker performance and assess missile performance capabilities.

The TD phase integrated the STO efforts and IFS development work, allowing a request for proposal to be

released in August 2003. All bidding contractors delivered mature IFS modeling and simulation (M&S) tools as part of their proposals. The source selection board then used the contractor's own IFS for performance evaluation of the missile

development plan. The winning prime contractor, Lockheed Martin, delivered the latest version of its IFS upon contract award. This level of maturity in the M&S tools at this stage in the program is unprecedented for a missile development program. The JCM M&S tools will impact the design and supportability of the missile early in the program before design changes become economically unaffordable.

PMO Formation

Although the acquisition development model states that systems acquisition begins at MS B, forming and

staffing the PMO well before MS B is vital to program success. The JCM PMO — formed in October 2001, 2 years prior to the planned MS B — provided TD phase oversight and facilitated the smooth acquisition community integration into the requirements generation process. Forming the PMO early ensured adequate time to develop and obtain approval for MS B documentation. Despite acquisition transformation initiatives, MS B documentation remains extensive. The approval and consistency of every JCM MS B document prior to MS B provided the Defense Acquisition Board (DAB) a clear indication of program support across the entire defense community and emphasized that the program was ready to enter SDD.

Requirements Generation

In early 2003, the JCM Program was chosen as the first program to enter the new Joint Capabilities and

Integration Development System (JCIDS) process. The JCIDS process seeks to enhance the methodology to identify and prioritize capability gaps and improve coordination between the services. Likewise, JCIDS helps develop program support from the Joint staff, strengthening the services' commitment to the program — the single biggest factor in program approval to enter SDD. JCM PMO personnel played key roles in the integrated concept team that developed the Initial Capabilities Document (ICD), Analysis of Alternatives (AoA) and Capabilities Development Document (CDD). The JCM ICD established the

and representatives from the PMO, S&T development community, and service/ Office of the Secretary of Defense staffs — gathered to develop the RA. ATEC and the PMO ensured the ultimate success of the “lockdown” meeting by agreeing on a common assessment methodology and missile work breakdown structure (WBS) identifying critical missile components. The RA produced a high, medium-high, medium, medium-low and low assessment of program risks for critical JCM subsystems at four time periods — current, at MS B, end of Phase I and at MS

streamlining and transformation. The program management lessons learned can guide any program entering SDD. Long-term strategic plans with warfighter input provide guidance for technology maturation efforts in the S&T program, and facilitate the transfer of technologies to the PMO for system integration and demonstration efforts. Pre-MS B PMO formation allows acquisition S&T development oversight, early integration into the JCIDS process and enough time to prepare MS B program documentation. Embracing

the SBA approach in the TD phase enables mature M&S tools to be used early in the SDD effort and during contractor source selection. Adopting an aggressive con-

sensus risk management process agreed upon by the acquisition, user, testing and S&T communities provides a focus for TD and SDD activities and a common understanding of program risks and risk mitigation efforts.

MAJ ROBERT F. MORTLOCK is an APM, JCM Project Office, PEO Tactical Missiles, Redstone Arsenal, AL. He holds a B.S. degree in chemical engineering from Lehigh University, an M.B.A from Webster University, a Ph.D. in chemical engineering from the University of California-Berkeley and a Professional Engineering license in New York. Mortlock is an Army Acquisition Corps and Uniformed Army Scientist and Engineer Program member.

Unmanned aerial vehicle operators can launch the JCM out of sight of enemy targets. (U.S. Army photo.)

need for a materiel solution, and the JCM AoA provided data to quantify CDD performance requirements. The JCM Program emerged from the JCIDS process with a Joint Requirements Oversight Council (JROC)-approved ICD, an approved AoA and a JROC-approved CDD.

Risk Management

Developing a consensus risk assessment (RA) prior to MS B provided a common focus for developing the JCM by identifying program risks and associated risk mitigation efforts throughout the program. In early 2003, JCM Program stakeholders recognized the need for a consolidated program RA. The PMO and the Army Test and Evaluation Command (ATEC) jointly chaired the RA development process. The PMO and ATEC held a “lockdown” meeting where participants — including Army, Navy and Marine Corps users; Army and Navy testers;

C. For each WBS component, a waterfall or risk burn-down chart was developed that specifically identified tests and M&S activities required to support risk assessments at MS B, the end of Phase I and at MS C. Additionally, quantitative MS exit criteria were derived from those activities. The RA affected the program acquisition strategy, which ultimately included a risk mitigation phase prior to the system integration and demonstration phase. The RA also provided focus for the pre-SDD development activities leading to the DAB review, and served as the MS B System Evaluation Report.

The JCM Program has embraced an innovative acquisition management approach that serves as an example for acquisition reform, technology transfer,

